**GCSE – Graph Transformations**

**Mini-Exercise**

|  |  |  |  |
| --- | --- | --- | --- |
| $$y=f\left(x\right)$$ | $$(4,3)$$ | $$(1,0)$$ | $$\left(6,-4\right)$$ |
| $$y=f(x+1)$$ |  |  |  |
| $$y=f\left(x\right)-1$$ |  |  |  |
| $$y=f(-x)$$ |  |  |  |
| $$y=-f(x)$$ |  |  |  |
| $$y=f(2x)$$ |  |  |  |
| $$y=3f(x)$$ |  |  |  |
| $$y=f\left(\frac{x}{4}\right)$$ |  |  |  |

**Test Your Understanding**

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**Question 1**



The diagram shows part of the curve with equation
$y=f\left(x\right)$.The minimum point of the curve is at (2,–1)

Write down the coordinates of the minimum point of the curve with equation $y=f\left(x+2\right)$

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**Question 2**



The diagram shows part of the curve with equation
$y=f\left(x\right)$. The minimum point of the curve is at (2,–1)

Write down the coordinates of the minimum point of the curve with equation $y=3f\left(x\right)$

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**Question 3**



The diagram shows part of the curve with equation
$y=f\left(x\right)$ The coordinates of the maximum point of the curve are $\left(3,5\right)$.

Write down the coordinates of the maximum point of the curve with equation $y=f\left(3x\right)$

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**Question 4**

The curve with equation $y=f\left(x\right)$ has a maximum point at $\left(2,-7\right)$.

Find the coordinates of the minimum point of the curve with equation $y=-f\left(x\right)$

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**Question 5**

Here is the graph of $y= sin x^{°}$ for $0\leq x\leq 360$



In $0\leq x\leq 360$, the graph of
$y= sin \left(\frac{x}{2}\right)^{°}+3$ has a maximum at the point $A$.

Write down the coordinates of $A$.

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**Question 6**

The graph of $y=f\left(x\right)$ is shown on the grid.



The graph of $y=f\left(x\right)$ has a turning point at the point $\left(-1,1\right)$. Write down the coordinates of the turning point of the graph of $y=f\left(-x\right)+2$

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**Question 7**



The diagram shows part of the curve with equation $y=f\left(x\right)$ The coordinates of the maximum point of the curve are $\left(3,5\right)$. The curve with equation $y=f\left(x\right)$ is transformed to give the curve with equation
$$y=f\left(x\right)-4$$

Describe the transformation.

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**Question 8**

The graph of $y=g\left(x\right)$ is shown on the grid.



Graph $B$ is a translation of the graph of $y=g\left(x\right)$.

Write down the equation of graph $B$.

$y=$ **..........................**

**Question 9**

The graph of $y=f\left(x\right)$ is shown on the grid.



Graph $A$ is a reflection of the graph of $y=f\left(x\right)$.

Write down the equation of graph $A$.

$y=$ **..........................**

**Question 10**

This is a sketch of the curve with equation $y=f\left(x\right)$ .
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

The curve with equation $y=x^{2}$ has been translated to give the curve $y=f\left(x\right)$.

Find $f\left(x\right)$ in terms of $x$.

$f\left(x\right)=$ **..........................**

**Question 11**

Here is the graph of $y=f\left(x\right)$

On the grid, draw the graph of $y=2f\left(x\right)$



**Question 12**

Here is the graph of $y=f\left(x\right)$

On the grid, draw the graph of $y=f\left(-x\right)$



**Question 13**

The coordinates of the turning point of the graph of $y=x^{2}-8x+25$ is $\left(4,9\right)$.

Hence describe the single transformation which maps the graph of $y=x^{2}$ onto the graph of
$y=x^{2}-8x+25$.

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**Question 14**

Here is the graph of $y= sin x$, where $0^{°}\leq x\leq 360^{°}$



Match the following graphs to the equations.





|  |  |
| --- | --- |
| Equation  | Graph  |
| $$y=2 sin x$$ | .................. |
| $$y=- sin x$$ | .................. |
| $$y= sin 2x$$ | .................. |
| $$y= sin x+2$$ | .................. |
| $$y= sin \frac{1}{2}x$$ | .................. |
| $$y=-2 sin x$$ | .................. |

**Question 15**

 Here is a sketch of the curve *y* = *a* cos *bx*° + *c*,
0 ≤ *x* ≤ 360



 Find the values of *a*, *b* and *c*.

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